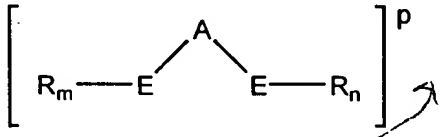
(Twice Amended) A late transition metal catalyst system for polymerization of olefin monomers comprising a Group 9, 10 or 11 metal complex stabilized by a bidentate ligand immobilized on a solid support where the late transition metal loading is less than 100 micromoles transition metal compound per gram of solid support, the Group 9, 10 or 11 metal complex stabilized by a bidentate ligand of the formula:

LMX_r

wherein M is a Group 9, 10 or 11 metal; L is a bidentate ligand defined by the formula:



wherein A is a bridging group containing a Group 13-15 element; each E is independently a Group 15 or 16 element bonded to M; each R is independently a C_1-C_{30} containing radical or diradical group which is a hydrocarbyl, substituted hydrocarbyl, halocarbyl, substituted halocarbyl, hydrocarbyl-substituted organometalloid, halocarbyl-substituted organometalloid, m and n are independently 1 or 2 depending on the valency of E; and p is the charge on the bidentate ligand such that the oxidation state of MX_r is satisfied; each X is, independently, a hydride radical, a hydrocarbyl radical, a substituted hydrocarbyl radical, a halocarbyl radical, a substituted halocarbyl radical, hydrocarbyl-substituted organometalloid or halocarbyl-substituted organometalloid; or two Xs are joined and bound to the metal atom to form a metallacycle ring containing from about 2 to about 20 carbon atoms; a neutral hydrocarbyl-containing donor ligand; a univalent anionic ligand; or two Xs are joined to form an anionic chelating ligand; or a neutral non-hydrocarbyl atom containing donor ligand; and r is 1, 2 or 3.

2. ~~The catalyst system of claim 1 wherein said particle support comprises silica~~

3. ~~The catalyst system of claim 1 wherein the supported catalyst is a homogeneous supported catalyst.~~

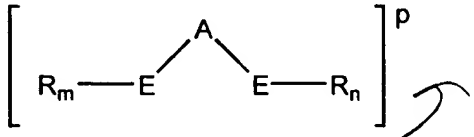
4. ~~The catalyst system of claim 1 wherein the metal complex is a first row metal complex.~~

5. ~~The catalyst system of claim 1 comprising a Group 9, 10 or 11 metal complex stabilized by a bidentate ligand structure having conjugated groups on a bridging element in said ligand.~~ wherein the bridging element comprises at least one conjugated group connected to

6. (Twice Amended) A late transition metal catalyst system for polymerization of olefin monomers comprising a Group 9, 10 or 11 metal complex stabilized by a bidentate ligand, and an organoaluminum compound immobilized on a solid support, the Group 9, 10 or 11 metal complex stabilized by a bidentate ligand of the formula: wherein the catalyst precursor has the Formula:

$$LMX_r$$

wherein M is a Group 9, 10 or 11 metal; L is a bidentate ligand defined by the formula:



wherein A is a bridging group containing a Group 13-15 element; each E is independently a Group 15 or 16 element bonded to M; each R is independently a C_1-C_{30} containing radical or diradical group which is a hydrocarbyl, substituted hydrocarbyl, halocarbyl, substituted halocarbyl, hydrocarbyl-substituted organometalloid, halocarbyl-substituted organometalloid, m and n are

independently 1 or 2 depending on the valency of E; and p is the charge on the bidentate ligand such that the oxidation state of MX_r is satisfied; each X is, independently, a hydride radical, a hydrocarbyl radical, a substituted hydrocarbyl radical, a halocarbyl radical, a substituted halocarbyl radical, hydrocarbyl-substituted organometalloid or halocarbyl-substituted organometalloid, or two Xs are joined and bound to the metal atom to form a metallacycle ring containing from about 2 to about 20 carbon atoms; a neutral hydrocarbyl-containing donor ligand; a univalent anionic ligand; or two Xs are joined to form an anionic chelating ligand; or a neutral non-hydrocarbyl atom containing donor ligand; and r is 1, 2 or 3.

7. The catalyst system of claim 6 wherein the organoaluminum compound is an alumoxane.

8. The catalyst of claim 7 wherein the metal complex to alumoxane molar ratio is from about 1:500 to 10:1.

9. The catalyst system of claim 6 wherein the Group 9, 10 or 11 metal complex is represented by the formula:

$$LMX_r$$

wherein L is a bidentate ligand that stabilizes a square planar geometry and charge balances the oxidation state of MX_r; X is independently selected from the group consisting of a halogen, alkoxide, aryloxide, amide, phosphide or other univalent anionic ligand, or two such X are joined to form an anionic chelating ligand; and r is 0, 1, 2 or 3.

10. The catalyst system of claim 6 wherein said particle support comprises silica.

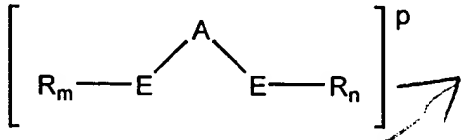
11. ~~The catalyst system of claim 6 wherein the supported catalyst is a homogeneous supported catalyst.~~

12. ~~The catalyst system of claim 6 wherein the metal complex is a first row metal complex.~~

13. (Twice Amended) A late transition metal catalyst system essentially without residual solvent for polymerization of olefin monomers comprising a Group 9, 10 or 11 metal complex stabilized by a bidentate ligand immobilized on a solid support, the Group 9, 10 or 11 metal complex stabilized by a bidentate ligand of the formula:

$$LMX_r$$

wherein M is a Group 9, 10 or 11 metal; L is a bidentate ligand defined by the formula:



wherein A is a bridging group containing a Group 13-15 element; each E is independently a Group 15 or 16 element bonded to M; each R is independently a C_1-C_{30} containing radical or diradical group which is a hydrocarbyl, substituted hydrocarbyl, halocarbyl, substituted halocarbyl, hydrocarbyl-substituted organometalloid, halocarbyl-substituted organometalloid, m and n are independently 1 or 2 depending on the valency of E; and p is the charge on the bidentate ligand such that the oxidation state of MX_r is satisfied; each X is, independently, a hydride radical, a hydrocarbyl radical, a substituted hydrocarbyl radical, a halocarbyl radical, a substituted halocarbyl radical, hydrocarbyl-substituted organometalloid or halocarbyl-substituted organometalloid; or two Xs are joined and bound to the metal atom to form a metallacycle ring containing from about 2 to about 20 carbon atoms; a neutral hydrocarbyl-containing donor ligand; a univalent anionic ligand; or two Xs are joined to form an anionic

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chelating ligand; or a neutral non-hydrocarbyl atom containing donor ligand; and

decline (d) → r is 1, 2 or 3.

14. ~~The catalyst system of claim 13 wherein said particle support comprises silica.~~ combine with 2 & 10 → new claim 33

15. ~~The catalyst system of claim 13 wherein the supported catalyst is a homogeneous~~ supported catalyst. combine with 3 + 11 → new claim 34

16. ~~The catalyst system of claim 13 wherein the metal complex is a first row metal~~ complex. combine with 4 & 12 → new claim 35

17. (Twice Amended) ~~The~~ catalyst system ~~of claim 13~~ wherein ~~said complex~~ has been treated with a noncoordinating anion precursor to form an ionic catalyst comprising a metal cation and a noncoordinating anion. (Three times) A ← (+ the catalyst precursor of Claim 1, 6, or 13)

18. The catalyst system of claim 17 wherein the noncoordinating anion is tetrakis(perfluorophenyl)boron.

19. (Twice Amended) The catalyst system of claim 17 wherein the noncoordinating anion precursor is a halide salt of Group 13-16 metals or metalloids. (three times)

20. (Twice Amended) The catalyst system of claim 19 wherein the ~~metal complex~~ to ~~noncoordinating anion precursor~~ molar ratio is from about 10:1 to 1:10. (Three times)

21. (Twice Amended) The catalyst system of claim 1 wherein said complex has been treated with a noncoordinating anion precursor to form an ionic catalyst comprising a metal cation and a noncoordinating anion. combine with 17 (Amended Once)

22. ~~The~~ polymerization process for polymerizing olefinically unsaturated monomers comprising contacting one or more of ethylene, C_3-C_{20} olefin, C_4-C_{20} cyclic olefin, C_4-C_{20} non-conjugated diolefin, C_8-C_{20} aromatic substituted olefin, C_4-C_{20} A

gem-substituted olefins, or C20-C1000 olefin macromer with the catalyst system of claim 17.

23. The polymerization process of claim 22 comprising conducting said contacting under gas phase polymerization conditions.

24. The polymerization process of claim 23 wherein the reactor temperature is from 100 °C to 150 °C and at a pressure up to 7000 kPa.

25. The polymerization process of claim 24 additionally comprising a scavenging compound.

26. The polymerization process of claim 22 comprising conducting said contacting under slurry polymerization conditions.

27. The polymerization process of claim 26 wherein the reactor temperature is from 0 °C to 150 °C and at a pressure from 0.76 MPa to 4.8 Mpa

28. The polymerization process for polymerizing olefinically unsaturated monomers comprising contacting one or more of ethylene, C_3-C_{20} olefin, C_4-C_{20} cyclic olefin, C_4-C_{20} non-conjugated diolefin, C_8-C_{20} aromatic substituted olefin, C_4-C_{20} gem-substituted olefins, or C_{20}-C_{1000} olefin macromer with the catalyst system of claim 6.

29. The polymerization process for polymerizing olefinically unsaturated monomers comprising contacting one or more of ethylene, C_3-C_{20} olefin, C_4-C_{20} cyclic olefin, C_4-C_{20} non-conjugated diolefin, C_8-C_{20} aromatic substituted olefin, C_4-C_{20} gem-substituted olefins, or C_{20}-C_{1000} olefin macromer with the catalyst system of claim 13.

30. (Once Amended) The catalyst system of claim 17 wherein LMX_r has a square planar geometry.